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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/027,813	12/19/2001	Robert G. Batchko	020882-000510	9477

26541 7590 01/16/2004

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EXAMINER

LEE, JOHN D

ART UNIT PAPER NUMBER

2874

DATE MAILED: 01/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/027,813

Applicant(s)

BATCHKO ET AL.

Examiner

John D. Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-94 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 38-51, 55-76, 89 and 93 is/are allowed.
- 6) ☒ Claim(s) 1-4, 7-31, 34-37, 52-54, 77-88, 90-92 and 94 is/are rejected.
- 7) ☒ Claim(s) 5, 6, 32 and 33 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 August 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 6) ☐ Other: ____

The eight (8) sheets of drawing filed on August 6, 2002, are acceptable.

The specification is objected to because of the following minor informalities. On page 1, the U.S. Patent Application Numbers that have been left blank must be furnished. It is also noted that one of the U.S. Provisional Application Numbers listed on page 1 does not agree with the corresponding number set forth in the declaration (page 1 gives "60/260,632", whereas the declaration gives "60/260,499"). Appropriate correction is required. Applicant's cooperation is requested in correcting any other errors of which applicant may become aware in the specification.

The specification is further objected to because the relationship between the instant Application and the previously filed Applications listed on page 1 is not made clear. Is the present Application a continuation, division, or continuation-in-part of any of these previously filed Applications? Clarification is required.

It is noted that a claim has been presented bearing claim number "**33b**". This is an improperly numbered claim (see 37 C.F.R. § 1.126 and MPEP § 608.01(m)) and has not been further considered.

Claims 85 and 89-91 are objected to because of the following minor informalities: claim 85 ends in two periods, but only one is necessary. In line 2 of claim 89, and in line 3 of claims 90 and 91, "plurality polarizations" should be changed to "plurality of polarizations". Appropriate correction is required.

The following is a quotation of the second paragraph of 35 U.S.C. § 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 2-4, 7, 9, 15-25, 27-37, 52-54, and 77-86 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 2, 3, and 4, as presented, each end in a semicolon, implying that there are additional (missing) claim limitations. The intended scope of these claims thus cannot be ascertained. Claim 4 also includes the limitation "further including a bent waveguide", but there is no indication as to where such bent waveguide is located or how it is interconnected to the other claimed elements. The claim is thus indefinite. Claim 7 includes the limitation "further including a mirror", but there is no indication as to where such mirror is located or how it is interconnected to the other claimed elements. The claim is thus indefinite. In line 6 of claim 9, there is no antecedent support for the term "said polarizing beam splitter", and the claim is thus indefinite. Claim 15 includes the limitation "further comprising a waveguide structure", but there is no indication as to where such waveguide structure is located or how it is interconnected to the other claimed elements. The claim is thus indefinite. Claims 16-22 depend from claim 15 and thus inherently contain the same indefiniteness. In line 2 of claim 23, there is no antecedent support for the term "the polarizing beam splitter", and the claim is thus indefinite. Claims 24 and 25 are indefinite because they are word-for-word identical, so that it is impossible to discern their intended different limitations. Also in these two claims, it is not clear where the electro-optic phase modulator is located (e.g. before or after the converter) or how it is interconnected to the other claimed elements. The claims are thus further indefinite. Claim 27 is indefinite because there is a period at the

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end of line 4 (it is assumed that this should be a comma), and there is no period at the end thereof, implying that there are additional (missing) claim limitations. The intended scope of this claim (along with that of all claims which depend therefrom) thus cannot be ascertained. In line 9 of claim 37, there is no antecedent support for the term "the second input/output port of said second waveguide", and the claim is thus indefinite. Perhaps the intended term is "the second input/output port of said first waveguide". In each of claims 52-54, the meaning of the phrase "wherein said polarization rotator is positioned near said first waveguide" is not understood. In claim 38 (from which these claims depend) it was clearly stated that the polarization rotator is disposed on the first waveguide. If it is already disposed on the first waveguide, then what additional meaning is imparted by stating that it is positioned near the same waveguide? The claim language is unclear and the claims are accordingly indefinite. In lines 2-3 of claim 77, there is no antecedent support for the term "said component input signals", and the claim is thus indefinite. It is suggested that the word "said" be stricken from this phrase. Claims 78-86 all depend (directly or indirectly) from claim 77 and thus inherently contain the same indefiniteness. In addition, in line 2 of claim 78, the word "one" should be inserted after "at least". Further, it is believed that claims 79-83 should each depend from claim 78 rather than from claim 77, since there is otherwise no proper antecedent support for the term "said controls" (line 1 of each of claims 79-83).

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 8-22, 26-31, 34-36, 87, 88, 90-92, and 94 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Brener et al (cited as reference W on the attached form PTO-892). Brener et al discloses a polarization-insensitive wavelength converter fabricated in lithium niobate. Although the details of fabrication are not set forth, it appears that the device is an integrated structure. The Brener et al wavelength converter includes a wavelength converting portion (PPLN waveguides) having input and output ports; and a polarization separator (PBS) having a first port for receiving an input optical signal, a second port providing a first component of the input optical signal in a first polarization mode, and a third port providing a second component of the input optical signal in a second polarization mode, with the second and third ports of the polarization separator being optically coupled to input ports of the wavelength converting portion. Figure 1 of Brener et al does not explicitly show a polarization rotator as a part of the device, but the use of polarization rotators is described in the first paragraph below Figure 2 on page 67. There, Brener et al states that polarization rotators were employed to provide for different combinations of polarizations to be measured. Since there are plural waveguide paths through the PPLN wavelength converting portion, it follows that a polarization rotator (as discussed by Brener et al) would have been placed between one of the outputs of the polarization separator (PBS) and one of the inputs of the PPLN wavelength converting portion. This is the same polarization rotator arrangement set forth in applicant's claims. The claimed subject matter, therefore, would have been entirely obvious to a person of ordinary skill in the

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art (at the time of applicant's invention) in view of the Brener et al reference. Note that Brener et al states that the polarization rotators are "fiber polarization rotators". The most commonly known and used fiber polarization rotators are fibers having a 90° twist to change the polarization mode. PPLN is known to be a quasi-phasematched structure. Similar materials exhibiting almost the same quasi-phasematched properties (such as lithium tantalate, MgO-doped lithium niobate, or MgO-doped lithium tantalate) would also have been obvious to use therein. Optical waveguides in these quasi-phasematched nonlinear structures are known to be formed by many equivalent techniques, including proton exchange, annealed proton exchange, metal (e.g. zinc or titanium) diffusion, and reverse proton exchange. The use of any of these techniques in forming the Brener et al PPLN wavelength converting portion would certainly have been obvious. The inclusion of additional (not shown) optical elements in the Brener et al device would have been obvious, as these would be used to enhance the operation of the device. Such optical elements could include lenses, reflectors, and frequency synthesizers.

Claims 5, 6, 32, and 33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Since Brener et al (the closest prior art of record) employs fiber polarization rotators, the use of rotators therein which are wave plates or electro-optic wave retarders would **not** have been obvious. There is also no disclosure or suggestion of the use of an optical circulator structure in Brener et al.

Claims 38-51, 55-76, 89, and 93 are allowed. Brener et al (the closest prior art of record) does not disclose or suggest the placement of a reflector at one of the output ports of the wavelength converting portion (PPLN waveguides) to reflect a signal back through the wavelength converting portion. There is also no disclosure or suggestion of the use of an optical circulator structure in Brener et al.

For all these same reasons, claims 2-4, 7, 23-25, and 52-54 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. § 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Claims 37 and 77-86 would also be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. § 112, second paragraph, set forth in this Office action. In addition to the reasons stated above, Brener et al does not disclose or suggest the evanescent coupling of light signals between the waveguides of the PPLN wavelength converting portion. Brener et al also does not disclose or suggest an interchannel crosstalk modulator for detecting levels of interchannel crosstalk between wavelength-converted optical signals so that either the amplitude of input optical signals or the converter gain level (or both) are modified to reduce interchannel crosstalk.


The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Other related polarization-insensitive wavelength converter structures can be seen in the cited articles by Yoo et al and Watanabe et al. Still other polarization-insensitive wavelength converting devices are shown by the cited U.S. Patent Application Publications to Kim et al and Fujiura et al. The cited U.S. Patent to

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Oikawa describes a wavelength conversion apparatus including a polarization separation element and a subsequent polarization combining element.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. § 103(a), the Examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR § 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the Examiner to consider the applicability of 35 U.S.C. § 103(c) and potential 35 U.S.C. §§ 102(e), (f) or (g) prior art under 35 U.S.C. § 103(a).

Any inquiry concerning the merits of this communication should be directed to Examiner John D. Lee at telephone number (703) 308-4886. The Examiner's normal work schedule is Tuesday through Friday, 6:30 AM to 5:00 PM. Any inquiry of a general or clerical nature (i.e. a request for a missing form or paper, etc.) should be directed to the Technology Center 2800 receptionist at telephone number (703) 308-0956, to the technical support staff supervisor (Team 2) at telephone number (703) 308-3072, or to the Technology Center 2800 Customer Service Office at telephone number (703) 306-3329.


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